

IN THE CLAIMS:

A complete listing of all the claims is now presented.

Claim 1. (Cancelled).

Claim 2. (Cancelled).

Claim 3. (Withdrawn).

The method according to claim 17,  
wherein the exchange of the catalysts or the variation of  
the amount of mass or exchange and variation in the sections (d),  
(g), and (j) takes place using a numerical random-check  
generator.

Claim 4. (Withdrawn).

The method according to claim 3, wherein the program codes  
G05CAF, G05DYF, G05DZF and G05CCF of the NAG Library (NAG FORTRAN  
Workstation Library, NAG Group Ltd., 1986) of a numerical random-  
check generator are used.

Claim 5. (Withdrawn).

The method according to claim 17,  
wherein the number  $n_1$  varying in their quantitative

composition or chemical composition or quantitative and chemical composition ranges from 5 to 100.

Claim 6. (Withdrawn).

The method according to claim 17,  
wherein the selection number  $n_2$ ,  $n_3$ , or  $n_{n+1}$  measures 5 to 30% of the number  $n_1$ .

Claim 7. (Withdrawn).

The method according to claim 17,  
wherein the main components are selected from the group comprised of Mg, Ca, Sr, Ba, Y, La, Ti, Zr, V, Nb, Cr, Mn, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga, In, C, Si, Sn, Pb, N, P, As, Sb, Bi, S, Se, Te, F, Cl, Ce and Nd.

Claim 8. (Withdrawn).

The method according to claim 17,  
wherein the mole fractions  $b_1 \dots b_j$  range from 0 to 50 mole-%.

Claim 9. (Withdrawn).

The method according to Claim 17,  
wherein catalyst mixtures are prepared by mixing salt

solutions of elements of components  $A^1 \dots A^i$ ,  $B^1 \dots B^j$ ,  $D^1 \dots D^k$  and  $T^1 \dots T^l$  followed by thermal treatment in the presence of a reactive or inert gas phase (tempering) or by jointly precipitating sparingly soluble compounds followed by tempering or by exposing support component  $T^1 \dots T^l$  to salt solutions or gaseous compounds of the components  $A^1 \dots A^i$ ,  $B^1 \dots B^j$ ,  $D^1 \dots D^k$  followed by tempering,

wherein the employed salts are nitrates, sulfates, phosphates, carbonates, halogenides, oxalates, carboxylates, or mixtures thereof or carbonyl compounds or as acetyl acetonates.

Claim 10. (Withdrawn).

The method according to claim 17,

wherein the catalytic reaction is carried out with liquid, evaporated, or gaseous reactants.

Claim 11. (Withdrawn).

The method according to claim 17,

wherein the reactants for the catalytic reaction are supplied to several reactors and the product stream exiting the reactors is separately analyzed for each individual reactor.

Claim 12. (Withdrawn).

The method according to claim 11,

wherein the catalytic reaction is performed by series-connecting or arraying 5 to 1,000 reactors comprised of spaces with catalytically active material,

wherein the diameter of these spaces measures 100  $\mu\text{m}$  to 10 mm, and the lengths measure 1 mm to 100 mm.

Claim 13. (Withdrawn).

The method according to claim 11,

wherein the throughput of reactants is selected for a preset reactor length in such a way as to achieve the desired degree of conversion.

Claim 14. (Withdrawn).

The method according to claim 11,

wherein the reactor is a monolithic block with several parallel channels, which can be closed selectively at the inlet or outlet side individually or in a larger number even during the catalytic reaction, or a porous module having channels extending preferably parallel to the flow direction of the reaction mixture, whose channels can be closed at the inlet or outlet side individually or in a large number even during the catalytic reaction.

Claim 15. (Withdrawn).

The method according to claim 17,

wherein the reactants for the catalytic reaction are supplied to the reactors and wherein the composition of the product streams exiting the reactors is analyzed by a measuring sensor, wherein the measuring sensor is guided two-dimensionally across the exit cross-section of all reactors or the reactors are moved two-dimensionally relative to the measuring sensor and the portion of the product streams received by the measuring sensor is supplied to the analytical device.

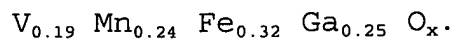
Claim 16. (Cancelled).

Claim 17. (Cancelled).

Claim 18. (Currently Amended).

The method according to ~~claim 17~~ claim 19,

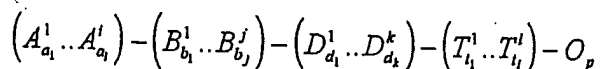
wherein a single solid catalyst species is



Claim 19. (New).

A method for producing active and/or selective solid catalysts of inorganic or organometallic materials or mixtures thereof comprising the steps of:

(a) preparing a first generation of catalysts having a number  $n_1$  of solid catalysts in the form of compounds of the formula (I)



wherein  $A^1 \dots A^i$  is a number  $i$  of different main components which are selected from the elements of the PTE, excluding trans uranium and noble gas elements, and the number  $i$  is between 1 and 10,

$B^1 \dots B^j$  is a number  $j$  of different minor components selected from the group of the elements Li, Na, Ka, Mg, Ca, Sr, Ba, Y, La, Ti, Zr, V, Nb, Cr, Mn, Tc, Re, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga,

In, C, Si, Sn, Pb, N, P, As, Sb, Bi, S, Se, Te, F, Cl, Ce  
and Nd, and the number  $j$  is between 1 and 10,

$D^1 \dots D^k$  is a quantity  $k$  of different doping elements  
selected from the group of the elements Li, Na, Ka, Mg, Ca,  
Sr, Ba, Y, La, Ti, Zr, V, Nb, Cr, Mn, Tc, Re, Fe, Ru, Os,  
Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd, Hg, B, Al, Ga,  
In, Si, Sn, Pb, N, P, As, Sb, Bi, S, Se, Te, F, Cl, Ce and  
Nd and the number  $k$  is between 1 and 10,

$T^1 \dots T^I$  is a number  $I$  of different support components  
which are comprised of oxides, carbonates, carbides, nitrides,  
borides of the elements Mg, Ca, Sr, Ba, La, Zr, Ce, Al, Si or  
a mixed phase of two or more thereof, and the number  $I$  is  
between 1 and 10, and  $O$  is oxygen,  $a_1 \dots a_i$  are identical or  
different mole fractions of 0 to 100 mole-% with the provision  
that the mole fractions

$a_1 \dots a_i$  cannot all be 0 at the same time,

$b_1 \dots b_j$  are mole fractions of 0 to 90 mole-%,

$d_1 \dots d_k$  are mole fractions of 0 to 10 mole-%,

$t_1 \dots t_l$  are mole fractions of 0 to 99 mole-%

$p$  is a mole fraction of 0 to 75 mole-%, wherein the sum of all mole fractions

$a_i + b_j + d_k + t_l$  may be not greater than 100 %, and

the number  $n_1$  of catalysts with different quantitative composition or different chemical composition or different weight and chemical compositions is in the range of 5 to 100,000; and

determining the fitness of the catalysts experimentally according to the activity or selectivity or activity and selectivity of the 1st generation catalysts for a given catalytic reaction in a reactor or in several series connected reactors;

- (b) selecting a number  $y_{n+1}$  of catalysts of  $n^{\text{th}}$  generation according to the highest activities for a catalytic reaction or the highest selectivities for the desired product and product mixture or the highest activity and selectivity of all 1<sup>st</sup> to  $n^{\text{th}}$  generation solid catalysts, wherein the number  $y_{n+1}$  is 1 to 50% of the number  $n_n$ ; wherein  $n$  is finite;



(c) preparing a  $n_{n+1}$ -th generation of solid catalysts from the selected  $y_{n+1}$  catalysts, wherein

$n_{n+1}$  new catalysts of the general formula (I) with A, B, D, T, a, b, d and t and p as defined under (a) are generated by:

selecting at least two respective catalysts from the number  $y_{n+1}$  of catalysts with a probability of  $w_{cat} = (y_{n+1})^{-1} \cdot 100\%$  and selecting at least one component of the selected at least two catalysts, respectively, with a pre-set probability W for each of the catalysts components  $W_A = (i \cdot y_{n+1})^{-1} \cdot 100\%$ ,  
 $W_B = (j \cdot y_{n+1})^{-1} \cdot 100\%$ ,  $W_D = (k \cdot y_{n+1})^{-1} \cdot 100\%$ ,  
 $W_T = (l \cdot y_{n+1})^{-1} \cdot 100\%$  using a random-number generator; and performing at least one of the steps of:

exchanging the selected components between the selected at least two respective catalysts to form new catalysts, and

varying a substance amount  $a_i$ ,  $b_j$ ,  $d_k$  and  $t_l$  of a catalyst component  $A^i$ ,  $B^j$ ,  $D^k$  and  $T^l$  selected with a probability

$W_A = (i \cdot y_{n+1})^{-1} \cdot 100\%$ ,  $W_B = (j \cdot y_{n+1})^{-1} \cdot 100\%$ ,  $W_D = (k \cdot y_{n+1})^{-1} \cdot 100\%$ ,

$W_T = (l \cdot y_{n+1})^{-1} \cdot 100\%$  for at least one of the selected catalysts by determining new values for the corresponding

mole fractions within the limits defined under (a) using a computerized random-number generator;

(d) determining a fitness of the catalysts experimentally by measuring the activity or selectivity or activity and selectivity of the  $(n+1)^{\text{th}}$  generation of catalysts for a given catalytic reaction in a reactor or in several series connected reactors;

(e) performing the selection of catalysts according to step (c), the preparation of a new catalyst generation according to step (d), and the determination of a fitness function according to step (e) until a catalyst generation is obtained, for which the fitness compared to the preceding generations is either not increased, or no longer significantly increased as an arithmetic mean.